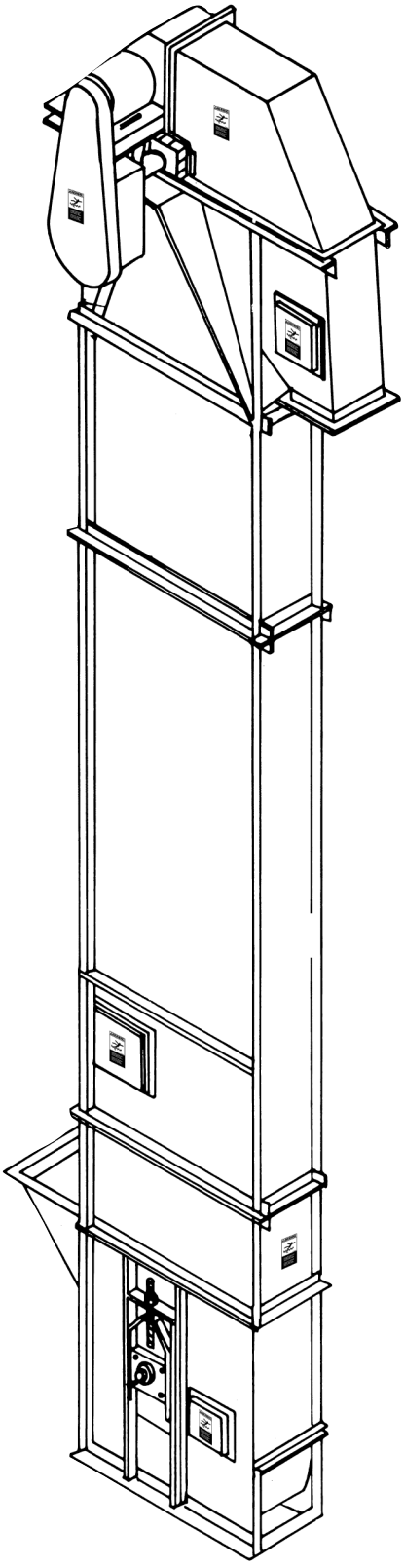
Martin Sprocket & Gear, Inc.
Conveyor Division
3600 McCart Street • Fort Worth, TX 76101-1038
817-258-3000 • (FAX) 817-258-3173
www.martinsprocket.com



# BUCKET ELEVATOR

# SAFETY

## INSTALLATION
## OPERATION
## MAINTENANCE
## INSTRUCTIONS

# WARNING AND SAFETY REMINDERS FOR SCREW , DRAG , AND BUCKET ELEVATOR CONVEYORS

*APPROVED FOR DISTRIBUTION BY THE SCREW CONVEYOR SECTION OF THE CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION (CEMA)*

It is the responsibility of the contractor, installer, owner and user to install, maintain and operate the conveyor, components and, conveyor assemblies in such a manner as to comply with the Williams-Steiger Occupational Safety and Health Act and with all state and local laws and ordinances and the American National Standards Institute (ANSI) B20.1 Safety Code.

In order to avoid an unsafe or hazardous condition, the assemblies or parts must be installed and operated in accordance with the following minimum provisions.

1. Conveyors shall not be operated unless all covers and/or guards for the conveyor and drive unit are in place. If the conveyor is to be opened for inspection cleaning, maintenance or observation, the electric power to the motor driving the conveyor must be LOCKED OUT in such a manner that the conveyor cannot be restarted by anyone; however remote from the area, until conveyor cover or guards and drive guards have been properly replaced.

2. If the conveyor must have an open housing as a condition of its use and application, the entire conveyor is then to be guarded by a railing or fence in accordance with ANSI standard B20.1.(Request current edition and addenda)

3. Feed openings for shovel, front loaders or other manual or mechanical equipment shall be constructed in such a way that the conveyor opening is covered by a grating. If the nature of the material is such that a grating cannot be used, then the exposed section of the conveyor is to be guarded by a railing or fence and there shall be a warning sign posted.

4. Do not attempt any maintenance or repairs of the conveyor until power has been LOCKED OUT.

5. Always operate conveyor in accordance with these instructions and those contained on the caution labels affixed to the equipment.

6. Do not place hands, feet, or any part of your body, in the conveyor.

7. Never walk on conveyor covers, grating or guards.

8. Do not use conveyor for any purpose other than that for which it was intended.

9. Do not poke or prod material into the conveyor with a bar or stick inserted through the openings.

10. Keep area around conveyor drive and control station free of debris and obstacles.

11. Eliminate all sources of stored energy (materials or devices that could cause conveyor components to move without power applied) before opening the conveyor

12. Do not attempt to clear a jammed conveyor until power has been LOCKED OUT.

13. Do not attempt field modification of conveyor or components.

14. Conveyors are not normally manufactured or designed to handle materials that are hazardous to personnel. These materials which are hazardous include those that are explosive, flammable, toxic or otherwise dangerous to personnel. Conveyors may be designed to handle these materials. Conveyors are not manufactured or designed to comply with local, state or federal codes for unfired pressure vessels. If hazardous materials are to be conveyed or if the conveyor is to be subjected to internal or external pressure, manufacturer should be consulted prior to any modifications.

CEMA insists that disconnecting and locking out the power to the motor driving the unit provides the only real protection against injury. Secondary safety devices are available; however, the decision as to their need and the type required must be made by the owner-assembler as we have no information regarding plant wiring, plant environment, the interlocking of the screw conveyor with other equipment, extent of plant automation, etc. Other devices should not be used as a substitute for locking out the power prior to removing guards or covers. We caution that use of the secondary devices may cause employees to develop a false sense of security and fail to lock out power before removing covers or guards. This could result in a serious injury should the secondary device fail or malfunction.

There are many kinds of electrical devices for interlocking of conveyors and conveyor systems such that if one conveyor in a system or process is stopped other equipment feeding it, or following it can also be automatically stopped.

Electrical controls, machinery guards, railings, walkways, arrangement of installation, training of personnel, etc., are necessary ingredients for a safe working place. It is the responsibility of the contractor, installer, owner and user to supplement the materials and services furnished with these necessary items to make the conveyor installation comply with the law and accepted standards.

Conveyor inlet and discharge openings are designed to connect to other equipment or machinery so that the flow of material into and out of the conveyor is completely enclosed.

One or more warning labels should be visible on conveyor housings, conveyor covers and elevator housings. If the labels attached to the equipment become illegible, please order replacement warning labels from the OEM or CEMA.

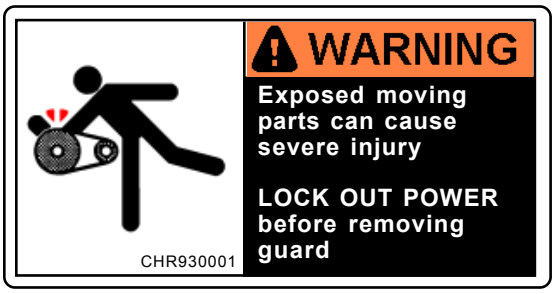
The Conveyor Equipment Manufacturers Association (CEMA) has produced an audio-visual presentation entitled “Safe Operation of Screw Conveyors, Drag Conveyors, and Bucket Elevators.” CEMA encourages acquisition and use of this source of safety information to supplement your safety program.

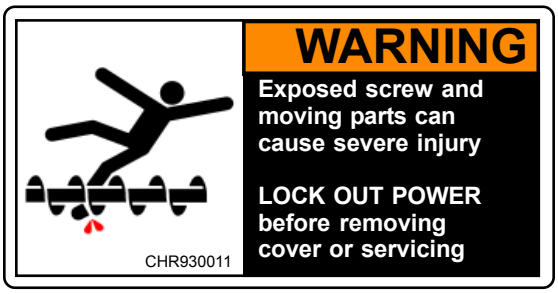
**SEE OTHER SIDE FOR SAFETY LABELS**

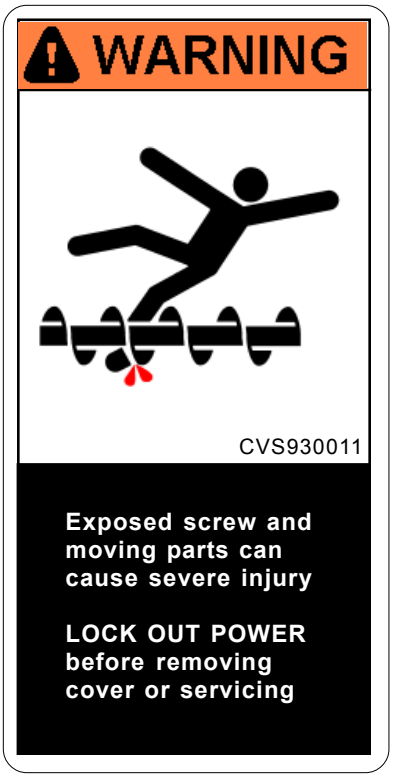
NOTICE: This document is provided by CEMA as a service to the industry in the interest of promoting safety. It is advisory only and it is not a substitute for a thorough safety program. Users should consult with qualified engineers and other safety professionals. CEMA makes no representations or warranties, either expressed or implied, and the users of this document assume full responsibility for the safe design and operation of equipment.

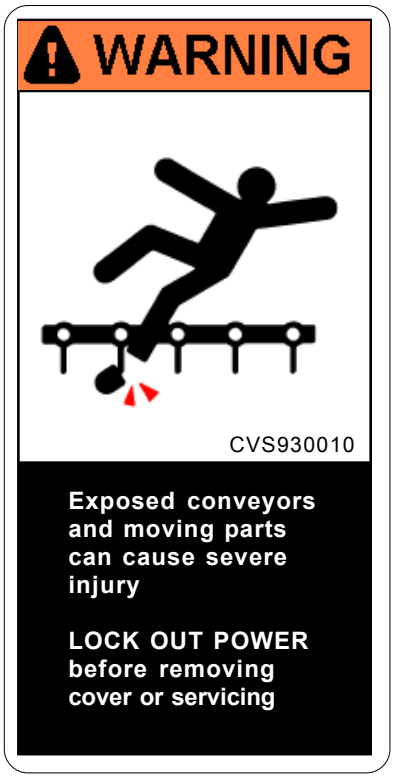
# CEMA Safety Labels

The CEMA safety labels shown below should be used on screw conveyors, drag conveyors, and bucket elevators. Safety labels should be placed on inlets, discharges, troughs, covers, inspection doors & drive guards. See CEMA Safety Label Placement Guidelines on CEMA Web Site: http://www.cemanet.org/safety/guidelines.html




WARNING
Exposed screw and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing
CHR930011


WARNING
CVS930011
Exposed screw and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing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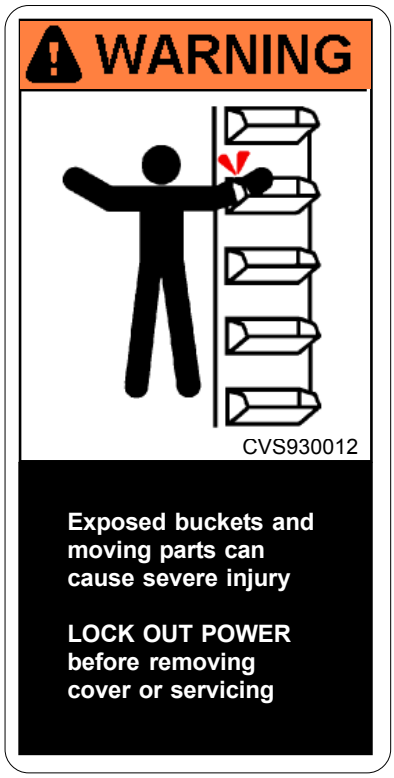
CVS930010
Exposed conveyors and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing


WARNING
CVS930012
Exposed buckets and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing

***PROMINENTLY DISPLAY THESE SAFETY LABELS ON INSTALLED EQUIPMENT***

***SEE OTHER SIDE FOR SAFETY REMINDERS***

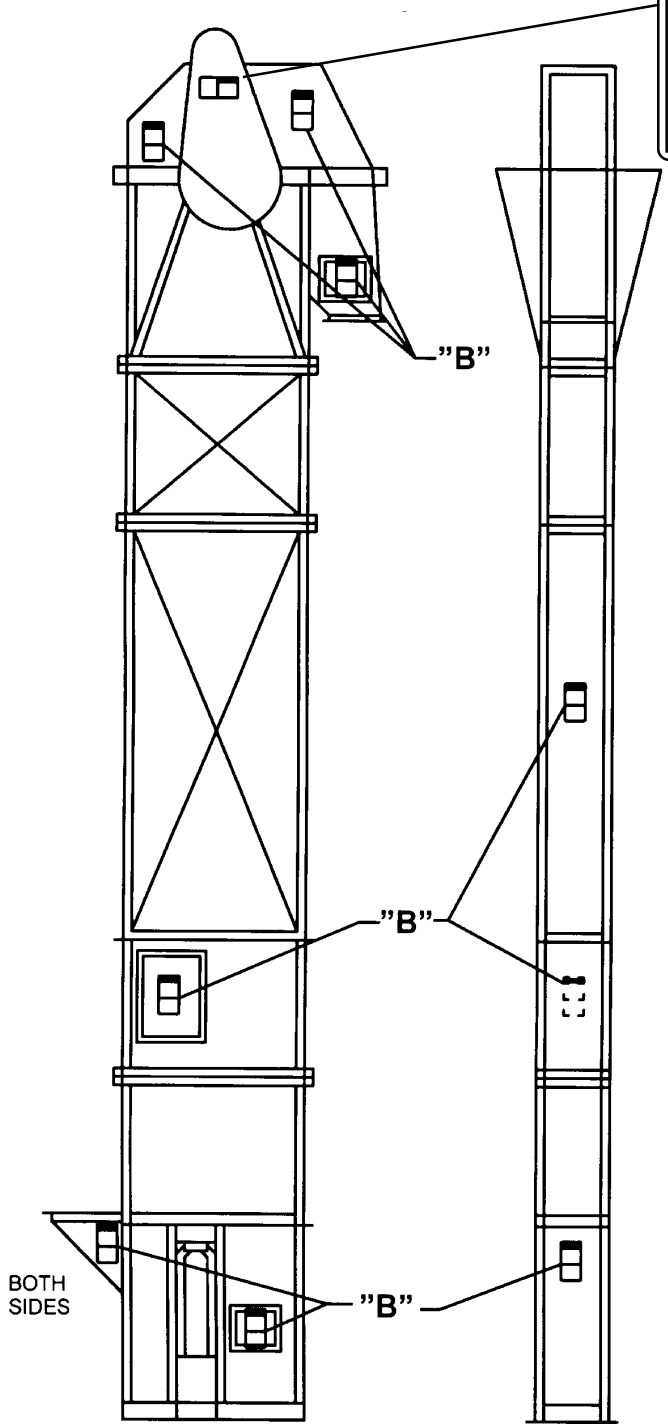
***Note: Labels alone do not substitute for a thorough in-plant safety training program centered on the hazards associated with operating your installed equipment.***

***Contact CEMA or Your Equipment Manufacturer for Replacement Labels***

**CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION**
6724 Lone Oak Blvd., Naples, Florida 34109
239-514-3441

## Product: Screw Conveyors

### Equipment: Bucket Conveyor



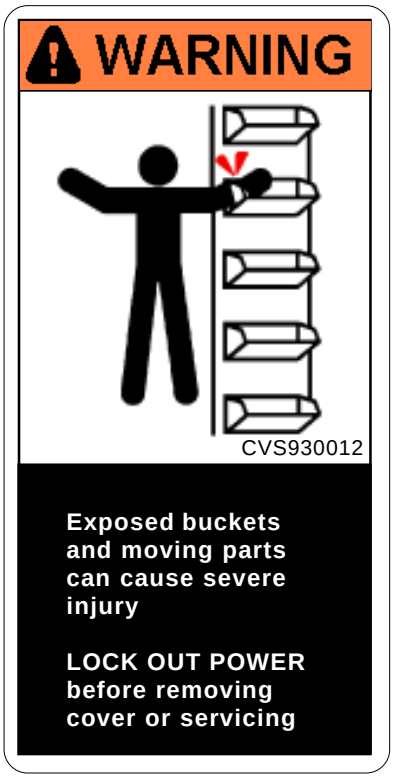
**"A"**

To be placed on removable guards to warn that operation of the machinery with guards removed would expose chains, belts, gears, shafts, pulleys, couplings, etc. which create hazards

USE LABEL "A" ON BELT GUARD
USE LABEL "B" ON EACH SIDE OF INTAKE, ALL BOLTED PANELS AND INSPECTION DOORS, AND BOTH SIDES OF SPLIT HOOD.

**NEAR SIDE**

**FAR SIDE**


WARNING
CVS930012
Exposed buckets and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing

**"B"**

To be placed on intakes, bolted guards and panels, hoods and doors of bucket conveyors to provide warning against exposing buckets and moving parts while in operation.

# THESE CEMA SAFETY LABELS CAN HELP MAKE YOUR CONVEYING EQUIPMENT OPERATIONS SAFER

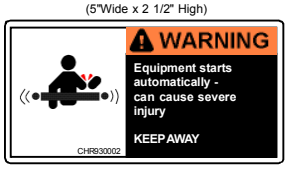
CHR930001
CHS930001
(5"Wide x 2 1/2" High)

CHR930006
(5"Wide x 2 1/2" High)

WARNING
Exposed screw and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing
CHR930011

CHR930011
(5"Wide x 2 1/2" High)

CHS950017
(5" Wide x 2 1/2" High)




CHR930002
(5"Wide x 2 1/2" High)

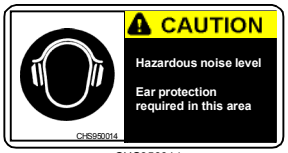
CHR930007
(5"Wide x 2 1/2" High)

CHS950013
(5"Wide x 2 1/2" High)

CHS950018
(5"Wide x 2 1/2" High)

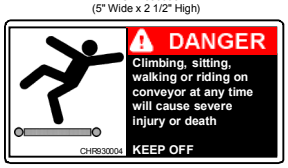
CHR930003
(5" Wide x 2 1/2" High)

CHR930008
(5"Wide x 2 1/2" High)

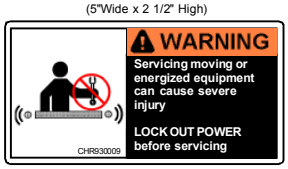



CHS950014
(5"Wide x 2 1/2" High)

CHS950021
(5"Wide x 2 1/2" High)




CHR930004
(5" Wide x 2 1/2" High)

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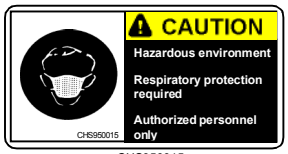


CHS950015
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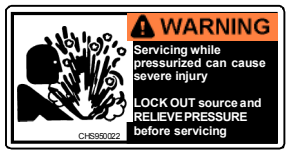
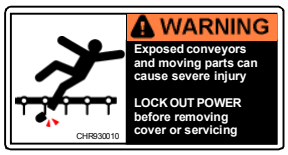
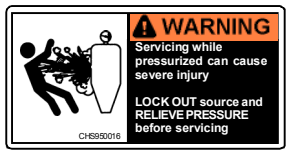

WARNING
Servicing while pressurized can cause severe injury
LOCK OUT source and RELIEVE PRESSURE before servicing
CHS950022

CHS950022
(5"Wide x 2 1/2" High)

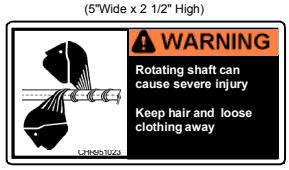
CHR931005
(5"Wide x 2 1/2" High)


WARNING
Exposed conveyors and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing
CHR930010

CHR930010
(5"Wide x 2 1/2" High)


WARNING
Servicing while pressurized can cause severe injury
LOCK OUT source and RELIEVE PRESSURE before servicing
CHS950016

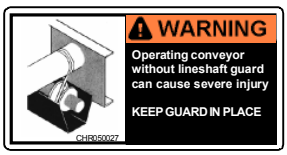
CHS950016
(5"Wide x 2 1/2" High)



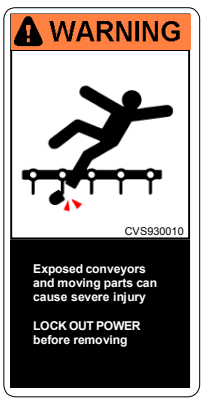

CHR951023
(5"Wide x 2 1/2" High)

CHR000025
(5"Wide x 2 1/2" High)

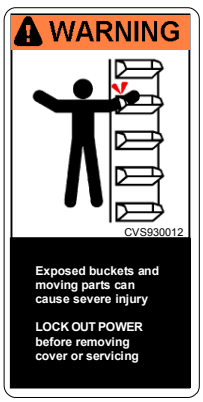
CHS991026
(5"Wide x 2 1/2" High)




CHR050027
(5"Wide x 2 1/2" High)



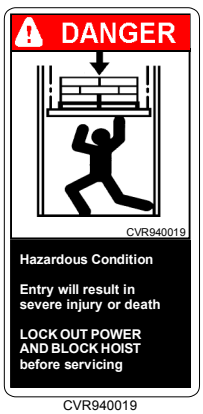

CVS930010
(3" Wide x 6" High)


WARNING
CVS930012
Exposed buckets and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing

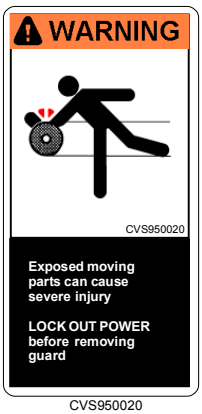
CVS930012
(3" Wide x 6" High)

WARNING
CVS930011
Exposed screw and moving parts can cause severe injury
LOCK OUT POWER before removing cover or servicing

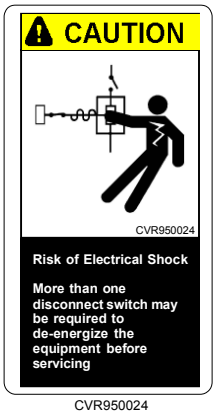
CVS930011
(3" Wide x 6" High)


DANGER
CVR940019
Hazardous Condition
Entry will result in severe injury or death
LOCK OUT POWER AND BLOCK HOIST before servicing

CVR940019
(3" Wide x 6" High)



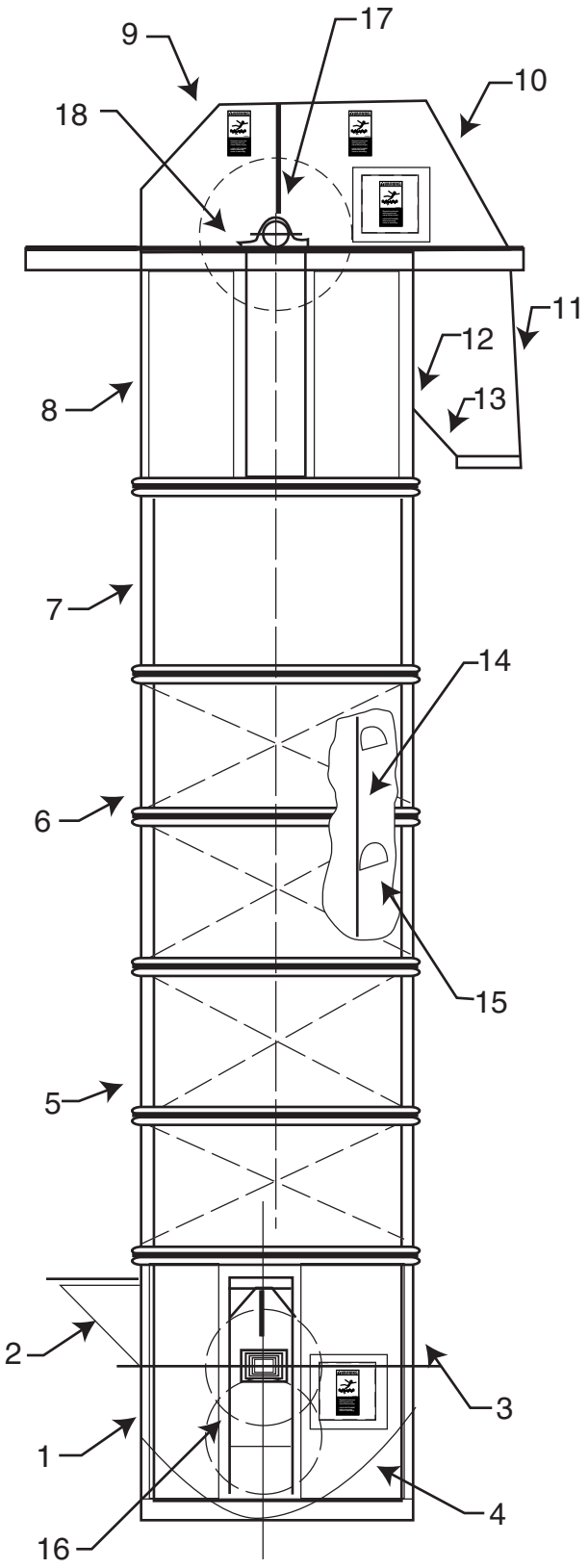

CVS950020
(3" Wide x 6" High)


CAUTION
CVR950024
Risk of Electrical Shock
More than one disconnect switch may be required to de-energize the equipment before servicing

CVR950024
(3" Wide x 6" High)

**As Of August 1, 2005**

# Installation




1. Boot Assembly
2. Inlet Spout
3. Removable Sprocket/Pulley Access Door
4. Curved Boot Plate
5. Intermediate Section. Access Doors Maybe Located At Any Convenient Position
6. Plain Intermediate Section
7. Plain Intermediate Section. Usually the Odd Length Located Under Lower Head Assembly
8. Lower Head Assembly
9. Back Section of Hood
10. Front Section Of Hood
11. Discharge Spout
12. Adjustable Bibb
13. Discharge Spout Liner (Optional item)
14. Elevator Chain or Belt
15. Elevator Buckets
16. Boot Take-up
17. Head Shaft Pillow Blocks
18. Pillow Block Stops (Optional)

**NOTE:**

It is the purchaser's responsibility to provide a suitable foundation and bolts to receive the elevator.

**RECEIVING:**

It is important to carefully examine incoming shipments for condition and completeness. Shortages and damage must be reported immediately to the transportation company. DO NOT ATTEMPT TO INSTALL A DAMAGED ELEVATOR OR COMPONENTS.

Normally head and boot sections are factory assembled and include sprockets or pulleys, take-ups, pillow blocks, etc.

Chain or belt, buckets, gaskets, nuts and bolts, special fittings, etc. are usually shipped in separate containers or on pallets/skids.

Intermediate casings are shipped separately.

# Installation

**CASING (All Elevators)**

A. Insure that anchor bolts are securely placed and conform to the pattern of the boot section mounting holes.

B. Set boot in place insuring that boot section top flange is level and casing is plumb.

This is accomplished by shimming under the bottom flange. Use shims only next to anchor bolts—not elsewhere along flange.

Any gap resulting from shimming is generally sealed with a strong structural grout.

C. It is essential that the boot be set accurately.

D. Check drawings to determine correct sequence of erecting intermediate casing. Caulk or gasketing (if provided) should be placed between all casing flanges to provide dust tight sealing.

E. Normally the erection crew should build a lifting bracket to avoid distortion to fabricated assemblies.

F. Each and every intermediate section must be level and plumb. It is common to find minor deviations in these types of fabricated assemblies.

Most often they can be corrected by rotating 180° or turning end for end.

If this does not solve an out of level or out of plumb condition it will be necessary to use metal shims and caulk the resulting gap.

When a gap occurs in a corner of the casing, metal shims should be used and should extend a minimum of six inches in both directions. Insure that shims do not project inside of casing.

Each intermediate section must be plumbed to less than 1/8" deviation before proceeding to the next section. **Casings must be braced or anchored to a rigid structure every 20 ft. and not more than 4 ft. below the head section**. If a rigid structure is not available, guy wires may be used with the same spacing.

G. After all intermediate sections are correctly placed, remove the front and back sections of the hood and set the lower head using the same procedures as with the intermediate sections. Replace hood sections after performing all installation steps H thru PC or PB.

H. It is critical that the head shaft be exactly level. Minor pillow block shimming may be necessary. Check head shaft pillow block set screws for tightness.

**MACHINERY (Chain Type)**

IC. Remove boot sprocket access door.

Drop plumb line from head end sprocket to boot sprocket. Insure that sprockets are centered in casing and are exactly in line with each other.

When erecting a double strand chain elevator, check factory drawings for correct sprocket spacing.

Check to insure that the sprocket set screws are tight. Sprockets should be in line when viewed from the narrow side of the casing.

Head and boot shafts are generally offset when viewed from the wide dimension of the casing. Check factory drawings for offset.

Double strand chain elevators commonly will have no offset as identical sprockets are used at the head and boot sections.

JC. Move boot take-up to its uppermost position (head end take-up to lowest position.) Make these adjustments uniformly to both sides at the same time. Many bearings will not accommodate much misalignment. Severe damage to internal bearing parts and seals can occur if this procedure is not followed.

KC. Depending on lifting equipment and access available, the chains and buckets can be preassembled or installed in 10 ft. sections of chain with buckets to be attached later.

When installing offset side bar chain, insure that the widest part of the side bar (open end) points in the direction of chain travel.

Use care not to get a side twist in the chain during handling.

LC. It may be necessary to remove up to several links of chain during initial installation.

# Installation

MC. Adjust take-up accordingly to provide 1/8" to 1/4" gap between the chain barrel and root of boot sprocket tooth. This gap should occur at 6 o'clock on the boot sprocket.

The gap is to accommodate chordal action of the chain.

On long pitch chain this gap can be increased accordingly.

Adjust bibb to provide up to 3/4" to 1" clearance to buckets.

NC. At this point you may find it desirable to "run in" the chain for a period of several hours.

OC. Install buckets using bolts, nuts and lock washers provided. It is a good idea to peen the bolt threads after the buckets are securely in place.

If plastic buckets are being installed, use care to avoid over tightening. Steel backups may be required.

PC. Adjust bibb to provide 3/4" to 1" clearance to buckets. Install upper hood front and back sections.

QC. After satisfactory alignment and trial operation, weld stops at each end of head shaft pillow blocks to prevent bearing movement. Stops may be of angle iron channels, key stock, etc.

**NOTES (Chain Type)**

AA. If elevator is equipped with gravity type take-up, use a come along or other means to raise takeup box to the upper most portion when coupling the chain together.

Add weight (concrete or steel stampings) to weigh box as required for smooth operation. Weight must be uniformly distributed in weight box.

Boot sprockets will fully engage the chain, however, insure that upward movement is available to accommodate chordal action of chain. Usually 2 to 3 inches is adequate.

BB. When installing double strand chain elevators be sure to lay out chains and verify equal lengths of parallel strands.

Double strand chains are usually matched and tagged left and right.

CC. On double strand elevators, one boot sprocket is keyed to the shaft, the other sprocket floats between shaft collars. Insure that these collars are tight.

Check shaft collars frequently for tightness. After all plumbing and other adjustments are made, it may be necessary to drill a set screw indent into boot shaft to hold shaft collar position.

DD. During~normal operations, avoid starting and stopping any elevator when loaded with material.

EE. If elevator components are to be stored at the job site for some time prior to erection, insure that components are protected from elements.

It is not advisable to cover elevator components tightly with polyethylene. Condensation will collect and cause corrosion and premature motor failure.

FF. If elevator is to be erected but not used for a long period of time, it is advisable to run the elevator at least one hour per week.

**MACHINERY (Belt Type)**

IB. Remove boot pulley access door.

Drop a plumb line from head end pulley to boot pulley.

Insure that pulleys are centered in casing and are exactly in line with each other.

Check to insure that the pulley set screws are tight.

Pulleys should be in line when viewed from the narrow side of the casing.

Head and boot shafts are generally offset when viewed from the wide dimension of the casing.

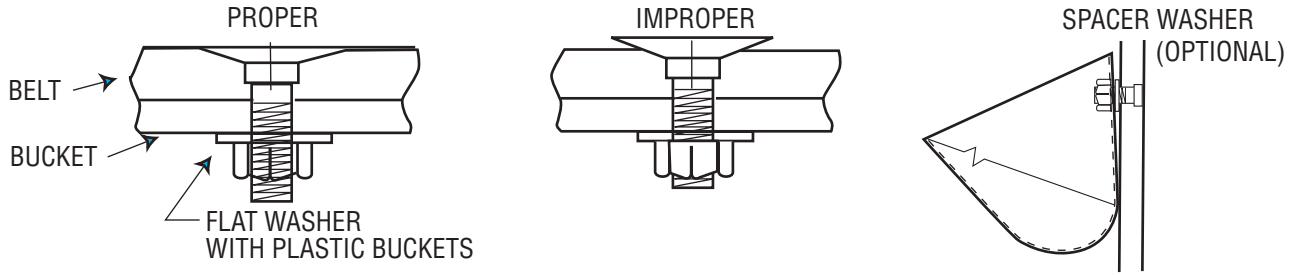
Check factory drawings for offset.

# Installation

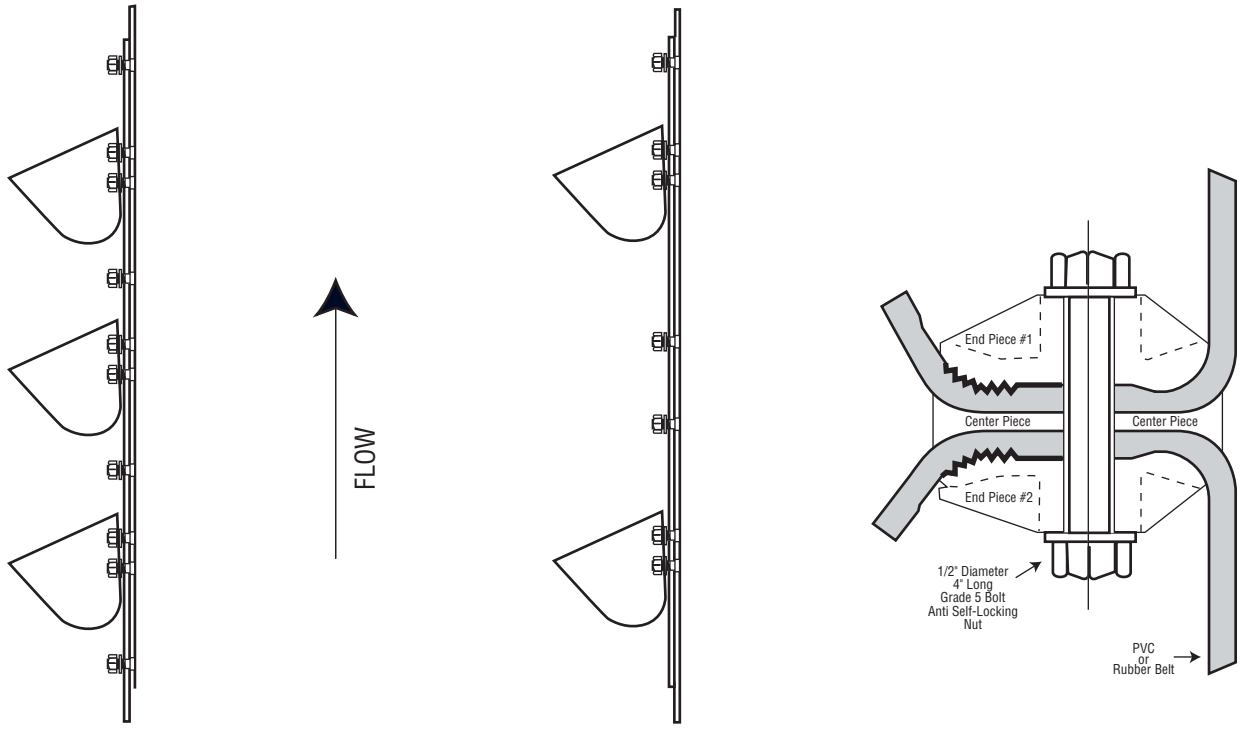
JB. Move boot take-up to its uppermost position (head end take-up to lowest position.) Make these adjustments uniformly to both sides at the same time. Many bearings will not accommodate much misalignment. Severe damage to internal bearing parts and seals can occur if this procedure is not followed.

KB. It is recommended, especially in cool environments, that the belt be draped over the head pulley and allowed to hang for at least 24 hours. This will relieve stresses resulting from being rolled up and tend to achieve initial stretch common to belting.

**ATTACHING BUCKETS TO ELEVATOR BELTS**




If rubber covered belt with unequal thickness covers is used, the thicker cover should be installed on the pulley side.




**LAP JOINT** **BUTT JOINT** **CLAMP SPLICE**

LB. Select the type of splice to be used from illustrations above.

MB. Clamp belt several feet from both ends using clamping angle irons and pull ends until a snug tension is achieved. Splice belt by installing elevator bolts, nuts, and washers. Often it is desirable to add one or more rows of additional bolt holes between buckets in the splice area. This is accomplished by drilling the holes while the belting is clamped in the pretensioned condition. If clamp splice is used follow instructions supplied with clamps.

# Installation

NB. Remove belt clamps and adjust take-ups uniformly to both sides to remove any slack in the belt. Use caution to avoid over tightening the belt as this can cause premature failure of: Belting, shafts, bearings, etc. At this point it is advisable to “run in” the belt for a period of several hours to observe belt tracking and any further initial stretch.

The responsibility to do the splice correctly lies with the installer.

OB. Install buckets using bolts, nuts and lock washers provided. It is a good idea to peen the bolt threads after the buckets are securely in place.

If plastic buckets are being installed, use care to avoid over tightening. Large diameter steel flat washers or fender washers are frequently used with plastic buckets.

PB. Adjust bibb to provide up to 3/4” to 1” clearance to buckets. Install upper hood front and back section.

QB. After satisfactory alignment and trial operation, weld stops at each end of head shaft pillow blocks to prevent bearing movement. Stops can be angle iron, channels, keystock material, etc.

**NOTES (Belt Type)**

AA. If elevator is equipped with gravity take-up, use a come-along or other means to raise take- up box to the upper most position when splicing the belt.

Add weight (concrete or steel stampings) to weight box as required for smooth operation. Weight must be uniformly distributed in weight box and sufficient to remove slack from belt.

BB. During normal operations, avoid starting and stopping any elevator when loaded with material.

CC. If elevator components are to be stored at the job site for a period of time prior to erection, insure that components are protected from the elements.

It is not advisable to cover elevator components tightly with polyethylene. Condensation will collect and cause corrosion to elevator components and possibly premature motor failure due to moisture in the windings.

DD. If elevator is to be erected but not used for a long period of time, it is least one hour per week.

**DRIVES (All Types)**

If drive is not factory assembled, install at this time.

1. **Gearmotor Drive**

Mount driven sprocket securely to head shaft.

Fill reducer with proper lubricant and install driver sprocket. Recommended oil is generally indicated on the reducer name tags.

Set reducer in position and line up drive sprockets.

Shorten center distance by adjusting movable base.

Install chain and connecting links.

Adjust slide base to a point where some sag is noted on the bottom strand of chain when the top strand is tight.

Lock base of reducer into position. Check all mounting bolts for tightness.

Install chain guard and add lubricant if oil bath guard is furnished.

If possible, rotate gearmotor by hand to determine whether the back stop is correctly installed. (See reducer

manufacturers instructions for additional details.)

Other types of backstops are frequently used. (See manufacturers instructions.)

2. **Shaft Mounted Gear Reducers**

Assemble back stop to reducer. (See manufacturers instructions.) Assemble reducer to head shaft using bushings and keys if provided.

# Installation

3. **Backstop / Torque Arms**

Removal of backstops or torque arms may cause unexpected machine movement. Remove or block all external loads before servicing the unit. Failure to observe these precautions could result in bodily injury.

Bolt motor in place and install driver and driven sheaves.

Check for alignment.

Attach turnbuckle and turnbuckle mounting bracket.

Install V-belts, tighten turnbuckle and lock in place with lock nuts.

Add oil to reducer. Recommended oil is generally indicated on the reducer name tag.

Install V-belt drive guard.

Connect electric motor.

# Operation

**START UP (All Types)**

Check to insure elevator is free of foreign materials before connecting power.

Check to insure all guards, covers, safety devices and controls are in place and operating correctly.

Initial start up of elevator should commence with several short jogs gradually lengthening in duration without material.

Check take-up adjustment after 8 hours.Retighten all fasteners. Check and realign sprockets/pulleys as necessary.

Gradually begin feeding material to the elevator. Increase feed rate slowly until reaching design capacity. Empty elevator. **LOCK OUT/TAG OUT ALL POWER**. Check for loose fasteners. Check alignment of sprockets/pulleys.

**Elevator should be checked for loose fasteners and alignment at least once a month.**

**OPERATION (Chain Type)**

When elevator is new it is common to have an occasional tight chain joint. This will cause some vibration but will eventually loosen.

If plastic buckets are used in conjunction with metal breaker buckets, it is normal to experience some pulsation. Characteristics of the material will affect the degree of pulsation. Pulsation is caused by the difference in bucket projection.

Do not intermix old chain and new chain in parallel strands. Always order matched lengths.

**Primary to satisfactory elevator operation is uniform material feed rates—not surge loading and excessive boot flooding.**

When consulting the factory regarding a specific elevator, refer to the purchase order number, year of manufacture if known, and equipment number if appropriate.

Regular inspection and maintenance will insure uninterrupted and satisfactory elevator performance.

**OPERATION (Belt Type)**

If plastic buckets are used in conjunction with metal breaker buckets, it is normal to experience some pulsation. Characteristics of the material will affect the degree of pulsation. Pulsation is caused by the difference in bucket projection.

Primary to satisfactory elevator operation is uniform material feed rates—not surge loading and excessive boot flooding.

Regular inspection and maintenance will insure uninterrupted and satisfactory elevator performance.

When consulting the factory regarding a specific elevator, refer to the purchase order number, year of manufacture if known, and equipment number if appropriate.

# Maintenance

Periodic inspections must be performed to determine the wear rate of all chains, buckets, belts and bearings. During these inspections the alignment of sprockets, pulleys and all drive components shall be checked. Retightening of fasteners and checks to insure guards, covers, gratings, controls, and safety devices are in place, secure, and operating correctly.

Keep a good supply of spare parts. When ordering, refer to our Service Manual and furnish the part identification as well as original order number.

WARNING: Removal of backstop may cause unexpected machinery movement as indicated by note 17 of "Safety" If backstop is installed as part of shaft mount reducer removal of torque arm may also cause unexpected machinery movement.

## Maintenance Checklist:

**Buckets:**

❑ Check buckets periodically for bucket damage and loose bolts.
All damaged buckets should be replaced or properly repaired.

**Discharge Bibb:**

❑ Check adjustable discharge bib for wear after a month of operation and replace discharge bibb if worn.
Inspect discharge bibb on a regular basis.

**Sprockets, Traction Wheels**

❑ Check sprockets and traction wheels for excessive, uneven, or unusual wear.
Replace sprockets or traction wheels if worn. On segmental sprockets, check and re-torque bolts on the replacement segments on both the head and boot shafts.

**Chain, Belt**

❑ Check the take-up for bucket clearance in the bottom of the boot housing.
To add clearance, remove (1) two-link section, as required.

❑ Inspect chain/belt regularly. Consult manufacturer for wear guidelines

**Important !!**

Correct all deficiencies before continuing/restarting operation of any machinery.

**Caution:**

Practice good housekeeping and use proper **LOCK OUT/TAG OUT ALL POWER** procedures.
Keep the areas around loading, discharge, drive and control points, clean and free from obstructions to maintain a safe environment for all personnel.

# Operation

| PROBLEM | POSSIBLE CAUSE |
|---|---|
| Elevator Vibrates | 1. Foreign matter in boot |
| | 2. Excessively tight chain/belt |
| | 3. Excessively loose chain/belt |
| | 4. Loose or broken buckets |
| | 5. Buckets hitting bibb plate |
| | 6. Misaligned elevator head and boot shaft |
| | 7. Elevator is not adequately braced. See para. F., installation |
| | 8. Chain/belt hitting inside of casing when casing is not plumb |
| Elevator Will Not Start | 1. Obstruction in boot |
| | 2. Electrical problem |
| | 3. Backstop incorrectly installed |
| | 4. Broken V-Belts or drive chains |
| | 5. Reducer failure |
| | 6. Boot excessively plugged with material |
| | 7. Excessively tight chain/belt |
| Pillow Blocks Get Hot | 1. Over lubrication |
| | 2. Under lubrication |
| | 3. Excessive chain/belt tension |
| | 4. Misalignment of head shaft pillow blocks |
| | 5. Misalignment between head and boot shaft |
| Elevator Not Discharging Properly | 1. Speed incorrect - consult factory |
| | 2. Air cushion - vent compartment being discharged into |
| | 3. Light fluffy materials - reduce speed up to 15% |
| | 4. Certain materials may require perforated buckets* |
| | 5. Some materials may be affected by static electricity* |

*Consult Factory

# Vendor Contact

Please use the following list of contacts concerning maintenance or troubleshooting questions associated with components not manufactured by Martin, but supplied on your conveyor equipment.

| GEAR REDUCERS | | |
|---|---|---|
| **SUPPLIER** | **PHONE NUMBER** | **ALTERNATE CONTACT** |
| DODGE | 803-297-4800 | Fax: 864-281-2381 |
| FALK | 414-342-3131 | Fax:414-937-4359 |
| NORD | 608-849-7300 | www.nord.com |
| SUMITOMO | 757-485-3355 | Fax: 757-485-3075 |
| DORRIS | 800-325-2520 | Intbtedorrisco.com |
| EURO-DRIVE | 905-639-7873 | Fax: 905-639-4895 |
| **MOTORS** | | |
| **SUPPLIER** | **PHONE NUMBER** | **ALTERNATE COMNTACT** |
| RELIANCE | 803-297-4800 | Fax:864-281-2381 |
| BALDOR | 501-646-4711 | www.baldor.com |
| SIEMANS | 800-964-4114 | www.sea.siemens.thomasrcgistcr.com |
| U.S. | 414-251-7724 | Fax:414-251-2748 |
| TOSHIBA | 800-663-3117 | Fax: 847-593-1616 |
| **BEARINGS** | | |
| **SUPPLIER** | **PHONE NUMBER** | **ALTERNATE CONTACT** |
| DODGE | 803-297-4800 | Fax: 864-281-2381 |
| SKF | 800-275-5416 | Fax:219-546-0448 |
| COOPER | 757-460-0925 | Fax: 757-464-3067 |

| MISCELLANOUS | | | |
|---|---|---|---|
| **SUPPLIER** | **EQUIPMENT** | **PHONE NUMBER** | **ALT. CONTACT** |
| MILTRONICS | MOTION SENSOR | 817-277-3543 | www.milltronics.com |
| ALAN BRADLEY | MOTION SENSOR | 414-382-2000 | Fax: 414-382-4444 |
| CONTROL CONCEPTS | MOTION SENSOR | 800-745-6551 | Fax: 860-928-9450 |
| ELECTRO-SENSORS | MOTION SENSOR | 800-328-6170 | www.electrosensors.com |
| ALLEN AIR | AIR CYLINDERS | 516-747-5450 | Fax:516-747-5481 |

If you cannot find the information required with the above listing of contacts, please contact your local Martin service center.

# Recommended Spares

The list of components provided below is our recommendation for spares required for general maintenance. Please use the enclosed bill of materials from the drawings or planning sheets to identify components specific to your equipment. Quantities should be equal to the previous amount given unless specified otherwise.

## BUCKET ELEVATOR

Bearings

V-belts

Buckets

Chain/Belt

Bolts

Please call Martin if you need additional information or help in determining your required spares.

# Bolt Torque

## General Bolt Tightening Torque

| Thread | Tensile Stress Area | SAE Grade 2 | | SAE Grade 5 | | SAE Grade 8 | |
|---|---|---|---|---|---|---|---|
| Size | Tsa | 75% Yield Strength (PSI) - 43000 | | 75% Yield Strength (PSI) - 69000 | | 75% Yield Strength (PSI) = 98000 | |
| | | Plain | Zinc Plated | Plain | Zinc Plated | Plain | Zinc Plated |
| | Square Inches | Ft.Lb. | Ft.Lb. | Ft.Lb. | Ft.Lb. | Ft.Lb. | Ft.Lb. |
| 1/4-20. | 0.0318 | 6 | 6 | 9 | 10 | 13 | 14 |
| 1/4-28. | 0.0364 | 7 | 7 | 10 | 12 | 15 | 16 |
| 5/16-18. | 0.0524 | 12 | 13 | 19 | 21 | 27 | 29 |
| 5/16-24. | 0.0580 | 13 | 14 | 21 | 23 | 30 | 33 |
| 3/8-16. | 0.0775 | 21 | 23 | 33 | 37 | 47 | 52 |
| 3/8-24. | 0.0878 | 24 | 26 | 38 | 42 | 54 | 59 |
| 7/16-14. | 0.1063 | 33 | 37 | 53 | 59 | 76 | 83 |
| 7/16-24. | 0.1187 | 37 | 41 | 60 | 66 | 85 | 93 |
| 1/2-13. | 0.1419 | 51 | 56 | 82 | 90 | 116 | 127 |
| 1/2-20. | 0.1599 | 57 | 63 | 92 | 101 | 131 | 144 |
| 9/16-12. | 0.1820 | 73 | 81 | 118 | 129 | 167 | 184 |
| 9/16-18. | 0.2030 | 82 | 90 | 131 | 144 | 186 | 205 |
| 5/8-11. | 0.2260 | 101 | 111 | 162 | 179 | 231 | 254 |
| 5/8-14. | 0.2560 | 115 | 126 | 184 | 202 | 261 | 287 |
| 3/4-10. | 0.3340 | 180 | 197 | 288 | 317 | 409 | 450 |
| 3/4-16. | 0.3730 | 200 | 221 | 322 | 354 | 457 | 503 |

The reason all applications should be evaluated to determine the optimum tightening torque is that the K factor in this formula is always an estimate.

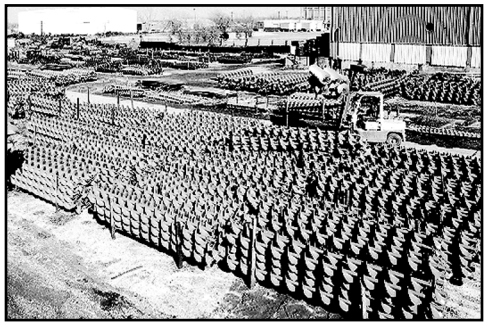
The most commonly used bolting K factors arc 0.20 for plain finished bolts, 0.22 for zinc plated bolts, and 0.10 for waxed or highly lubricated bolts

Formula: T= K x D x P

- T Target tighten torque (the result of this formula is in inch pounds, dividing by 12 yields foot pounds
- K Coefficient of friction (nut factor), always an estimation in this formula
- D Bolts nominal diameter in inches
- P Bolt's desired tensile load in pounds (generally 75% of yield strength) - [ P(lbs) = (75%) Yield Strength * Tensile Stress Area ]

Our Headquarters operation in Arlington, Texas serves as backup inventory for our Service Centers throughout North America.

Product availability rests on keeping finished inventory ready for quick delivery anywhere in the nation.



Screw conveyor inventories support the local distributors.

# USA

## General Offices
## Sales and Manufacturing

**Arlington, TX**
3100 Sprocket Drive 76015-2898
P.O. Box 91588
Arlington, Texas 76015-0088
817-258-3000 (FAX 817-258-3333)

## Sales and Manufacturing

**Danielsville, PA**
3376 Delps Road 18038
P.O. Box 267 • Danielsville, PA 18038-0267
610-837-1841 (FAX 610-837-7337)

**Ft. Worth, TX**
**(Conveyor & Tool Divisions)**
3600 McCart Ave.
Ft. Worth, TX 76110-4692
817-258-3000 (FAX 817-258-3173)

**Montpelier, OH**
350 S. Airport Road
Montpelier, OH 43543-9329
419-485-5515 (FAX 419-485-3565)

**Sacramento, CA**
1199 Vine Street
Sacramento, CA 95814-0426
916-441-7172 (FAX 916-441-4600)

**Scottdale, GA**
3303 Church Street 30079-1395
P.O. Box 886 • Scottdale, GA 30079-0886
404-292-8744 (FAX 404-292-7771)

## Mini Manufacturing Centers

**Boston, MA**
357 Fortune Boulevard
Milford, MA 01757
508-634-3990 (FAX 508-634-3998)

**Charlotte, NC**
3901 Scott Futrell Drive
Charlotte, NC 28208-3539
704-394-9111 (FAX 704-394-9122)

**Chicago, IL**
1505 Birchwood Avenue
Des Plaines, IL 60018-3001
847-298-8844 (FAX 847-298-2967)

**Denver, CO**
10800 East 54th Avenue
Denver CO 80239
303-371-8466 (FAX 303-371-7116)

**Detroit, MI**
12555 Belden Ct.
Livonia, MI 48150
734-367-0238 (FAX 734-367-0547)

**Houston, TX**
9910 Bent Oak Drive
Houston, TX 77040
713-849-4330 (FAX 713-849-4807)

**Kansas City, MO**
1520 N. Commerce Avenue
Kansas City, MO 64120-4961
816-231-5575 (FAX 816-231-1959)

**Los Angeles, CA**
5920 S. Triangle Drive
Commerce, CA 90040-3639
323-728-8117 (FAX 323-722-7526)

**Minneapolis, MN**
10601 Hampshire Avenue South
Bloomington, MN 55438-2395
952-829-0623 (FAX 952-944-9385)

**Portland, OR**
3030 N.W. Industrial
Portland, OR 97210-1734
503-223-7261 (FAX 503-221-0203)

**Tampa, FL**
3201 Queen Palm Drive
Tampa FL 33619
813-623-1705 (FAX 813-626-8953)

**Wayne, NJ**
7 High Point Drive
Wayne, NJ 07470-7432
973-633-5700 (FAX 973-633-7196)

## Manufacturing Only

**Abilene, TX**
**Clarksville, TX**
**Dallas, TX**
**Mansfield, TX**
**Paragould, AR (Includes the Plastics Div.)**

# CANADA

## Sales and Manufacturing

**Martin Sprocket & Gear Canada Inc.**
896 Meyerside Drive
Mississauga, Ontario, Canada L5T 1R9
905-670-1991 (FAX 905-670-2110)

**Martin Sprocket & Gear Canada Inc.**
**(Conveyor Division)**
1030 Industrial Road
Ayr, Ontario, Canada NOB 1EO
519-621-0546 (FAX 519-621-4413)

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**Martin Sprocket & Gear**
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For more information, contact your nearest Martin Distributor or Service Center.

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